REMARKS

In view of the above amendments and following remarks, reconsideration of the rejections that are contained in the final Office Action of February 20, 2009 is respectfully requested.

The Final Rejection

Claims 118-120 and 122 were rejected by the Examiner as being unpatentable over U.S. Patent 6,077,412 to Ting et al. (Ting). Further, claim 121 was rejected as being unpatentable over Ting and in further view of Talieh, U.S. Patent 6,176,922. Claim 123 was rejected by the Examiner as being unpatentable over Dordi (1) in view of Maloney et al. and Ting, further.

In each of these rejections, the Examiner takes the position that Ting discloses "numerous configurations and possibilities for rotating the cathode electrode and/or the substrate holding portion," but acknowledges that Ting does not disclose a step of rotating the two together at the cleaning position. However, the Examiner does consider Ting to teach rotation of the substrate holding portion while in the lower cleaning position where it is processed with a cleaning fluid and that the cathode portion is also cleaned during a cleaning step when the substrate holding portion is in the lower cleaning position. The Examiner further takes the position that "rotation of parts in general is an accepted practice for ensuring uniform distribution of a fluid," citing column 6, rows 11-14 of Ting. Thus, the Examiner concludes that based on the teachings of Ting, it would have been obvious to one of ordinary skill in the art exercising ordinary creativity, common sense and logic to configured the substrate holding portion and the cleaning position and the cathode portion to rotate together with each other at the time of the Applicants' invention in order to ensure uniform distribution of the cleaning fluid to the cathode portion.

However, it is respectfully submitted that the Examiner's conclusion is incorrect. Ting does not in fact support the conclusion that it would have been obvious to configure the substrate holding portion and the cathode portion of the cleaning position to rotate together with each other during cleaning and drying of the substrate, with a surface of the substrate being out of contact with the cathode electrode and the seal member. This will be explained in detail below.

The Present Invention

Both independent claims 118 and 123 have been amended to emphasize that the substrate holding portion in the cleaning position and the cathode portion are configured to rotate together with each other during cleaning and drying of the substrate, with a surface of the substrate being out of contact with the cathode electrode and the seal member. An example and a discussion of this structure is found in the specification and drawings, and will be explained as follows.

Noting page 50 of the substitute specification, at lines 9-12, the substrate holding portion 2-9 is adapted to rotate at an acceleration and velocity integrally with the cathode portion 2-10 through a rotating motor 2-14 and a belt 2-15. Note Figs. 8 and 9.

Noting page 55, at lines 20-27, the substrate holding portion 2-9 is lowered from the plating position B to the treatment and cleaning position C. While pure water is supplied from fixed nozzles 2-8, the substrate holding portion 2-9 and the cathode portion 2-10 are rotated to perform washing with water. The seal member 2-16 and the cathode electrode 2-17 are also cleaned simultaneously with the substrate W.

Noting the subsequent paragraph of the substitute specification, continuing from page 55 to page 56, after the washing is completed, the rotational speed of the substrate holding portion 2-9 and the cathode portion 2-10 is further increased to remove the water on the face of the substrate W by centrifugal force and to dry the face of the substrate W. The seal member 2-16 and the cathode electrode 2-17 are also dried at the same time.

Thus, with the present invention the substrate holding portion and the cathode portion are configured to rotate together with each other during cleaning and drying of the substrate with the substrate out of contact with the cathode electrode and the seal member. Integral rotation of the substrate holding portion and the cathode portion with the gap there between presents several advantages in the cleaning and drying of the substrate. In particular, in the drying operation, the rotation of the substrate holding portion and the cathode portion can dry the substrate and the cathode portion, which includes the cathode electrode and the seal member, simultaneously by centrifugal force. This improves the throughput of the process and avoids the necessity for a drying gas such as

N_2 gas. The above amendments have been made at this time to emphasize this point and to emphasize this distinction over the prior art, in particular the newly cited reference to Ting.

The Claims are not Obvious From Ting or the Other Cited References

As noted above, the Examiner considers Ting to render it obvious to configure the substrate holding portion, in the cleaning position, and the cathode portion, to rotate together with each other. This position by the Examiner is respectfully submitted to be incorrect. Ting does not in fact provide support for the Examiner's conclusion.

The Examiner first notes that Ting rotates the substrate holding portion while in a lower cleaning position, citing column 6, lines 45-49. Indeed, referring to Fig. 6, for example, the lower, or cleaning and drying, position of the wafer support is illustrated. The lower position ensures, in Ting, that when the wafer is spun, liquids are not spun out of the access opening.

However, in the embodiment of Figs. 5 and 6, the sleeve 12 is coupled to casing cover 22. As noted at lines 49-51 of column 5, it is possible to make the sleeve 12 rotatable within the chamber 10, and this is discussed with respect to a later embodiment. However, there is no such discussion with respect to the embodiment described with respect to Figs. 5 and 6.

The Examiner further states that the cathode portion is also cleaned during the cleaning step. Cleaning of the inside of the sleeve 12 is discussed at the top of column 8. This is a result of openings 37 in shaft 16. There is no description of the rotation of the sleeve at this step.

Thus, it should be particularly noted that Ting clearly describes that the wafer is made to rotate during the cleaning and drying cycle when the wafer is not engaged with the sleeve 12. This is clear from the position illustrated in Fig. 6. Note also column 13, lines 36-38: "the wafer is made to rotate in the cleaning and drying cycles, when the wafer is not engaged to the sleeve 12."

As noted above, Ting does in fact disclose a rotating sleeve beginning at line 55 of column 11. This is an alternative embodiment in which the sleeve 12 is made to rotate or oscillate when the wafer 35 is in the engaged position, i.e. when the wafer is undergoing the electroplating/electropolishing process. In describing this embodiment, Ting makes it clear that the sleeve 12 is driven to rotate by the rotation of the wafer support 13 when the wafer support 13

contacts the sleeve 12. Note column 12, lines 4-6: "the vessel 12, is driven to rotate by the rotation of the wafer support 13." Ting goes on to describe dowel pins located along the periphery of the sleeve 12 which mate with corresponding holes on a flat upper section 26 of the wafer support 13 so that the rotational movement of the support 13 will cause the sleeve 12 to rotate in unison. Thus, Ting makes it clear that the sleeve 12 will only rotate with the wafer 35 in the engaged position. Note lines 56-58 of column 11.

And, as discussed above, Ting makes it clear that when the wafer is made to rotate in the cleaning and drying cycle, the wafer is not engaged with the sleeve 12. The wafer support 13 is rotated during a cleaning and drying process, but the sleeve 12 is kept stationary, accordingly. In order to clean and dry the cathode 15 and the seal 42 that is on the lower portion of the sleeve 12, a manifold 19 is provided below the wafer support 13 in order to inject DI water and N_2 gas onto the cathode 15 and the seal 42.

Thus it is seen that when the sleeve 12 and the wafer support 13 are spaced from each other, it is impossible to dry the cathode 15 and the seal 42 by centrifugal force. Further, the arrangement of Ting requires a N_2 gas supply mechanism for drying the cathode 15 and the seal 42, which results in an increased initial cost and an increased running cost. Also, a N_2 gas supplying process can decrease the throughput.

When the sleeve 12 and the wafer support 13 are in contact with each other, they can in fact be rotated integrally. However, in this position the DI water, which is supplied onto the upper surface of the wafer, cannot be spun off with centrifugal force because the wafer is enclosed by the sleeve 12. As such, the wafer cannot be dried. Similarly, because the seal 42 and the cathodes 15 would contact the wafer as illustrated in Fig. 9, these portions would also not be able to be cleaned and dried.

Thus, it is clear that Ting does not configure the substrate holding portion and the cathode portion so that when the substrate holding portion is in the cleaning position, they are able to rotate together with each other. The above amendments to claims 118 and 123 emphasize that this is during cleaning and drying of the substrate, further. But in Ting the cleaning and drying of the

substrate take place together with the sleeve 12 spaced from the substrate holder 13, and thus they are not able to rotate together.

Returning now to the Examiner's rejection, the Examiner took the position that rotation of parts in general is an accepted practice for ensuring uniform distribution of a fluid, citing column 6, rows 11-14. Column 6, rows 11-14 of Ting states: "it is generally an accepted practice to rotate a wafer when it is subjected to certain processing medium. The rotation ensures a more uniform distribution of the medium over the wafer surface." However, this provides no support for the Examiner's position that it is obvious to configure the substrate holding portion and the cathode portion so that when the substrate holding portion is in the cleaning position they are configured to rotate together with each other during cleaning and drying of the substrate. This portion only supports the general proposition that it is known to rotate a semiconductor wafer during certain processing. Thus, this portion by itself is completely insufficient to support the Examiner's conclusion.

As discussed above, Ting does go on to discuss the possibility of a rotatable sleeve. However, the structure of Ting is to require that rotation occur only when the substrate holder 13 is engaged with the sleeve 12. Thus, such rotation cannot occur in the cleaning position, and the substrate holding portion and the cathode portion are clearly <u>not</u> configured to rotate together with each other at the cleaning position during cleaning and drying of the substrate as required by the claims.

Thus, Ting provides no indication whatsoever of any desirability of rotating the sleeve 12 together with the substrate holder 13 at the cleaning position. Ting provides no indication of any possible configuration of the components of Ting that would allow the components to do so. Ting just provides indications of possible structures that would accomplish rotation together only when they are engaged.

The Examiner's conclusion further appears to be based upon the Examiner's contention that Applicants' invention involves no more than one of ordinary skill in the art exercising ordinary creativity, common sense and logic. However, an initial problem is that there is nothing to indicate any desirability of having a sleeve 12 and the substrate holder 13 of Ting rotate together in the

cleaning position. It is only the present Applicants who have recognized that with the configuration of the present invention, the substrate holding portion and the cathode portion can be configured to rotate together with each other during cleaning and drying of the substrate with the substrate being maintained out of contact with the cathode electrode and the seal member. Such configuration enables the cleaning and drying of the wafer, the seal and the cathode simultaneously, without using any drying gas. Further, the cleaning operation and the drying operation can be performed successively simply by changing the rotational speed of the substrate holding portion and the cathode portion, as discussed above. This allows the throughput to be increased.

While the KSR decision has removed the potentially strict interpretation of the teaching, motivation and suggestion test, it did not remove the necessity for a conclusion of obviousness to be based upon there being a reason to make the modification. Ting provides no reason to make the modification that would be necessary to arrive at the present invention. No other prior art cited by the Examiner provides any such reason. There is no problem that is recognized by Ting or any of the other prior art cited by the Examiner that might lead to or be solved by the claimed configuration. It is also noted that the Examiner's stated objective of ensuring uniform distribution of the cleaning fluid to the cathode portion does not appear to be supported by any of the prior art that has been cited by the Examiner.

Accordingly, for the above reasons as it is respectfully submitted that all of the claims that are pending in the present application clearly patentably distinguish over Ting. This applies to the rejections based upon Ting by itself, or in combination with other references. While there may be further issues in the combinations of references that have been made by the Examiner, at this point in the prosecution it is not believed necessary to go into detail regarding any such further references at this point given the above clear difference with Ting and the lack of any reason to arrive at the claimed limitations based upon Ting. Accordingly, indication of the allowability of all of the claims that are pending in the application is respectfully requested.

Request for Interview

Applicants kindly request a telephonic interview with the Examiner to discuss the above prior to the Examiner taking action upon this amendment. Applicant will contact the Examiner in order to set an appointment for such interview.

Conclusion

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Respectfully submitted,

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